Behavioral Inhibition and Effortful Control: Independent and Interactive Predictors of Child Externalizing Behavior

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Externalizing symptoms, such as aggression, impulsivity and inattention, represent the most common forms of childhood maladjustment (Campbell et al., 2000). Mounting evidence and theory strongly suggest that temperament plays an important role in vulnerability to early externalizing symptoms (Muris & Ollendick, 2005). Two dimensions of temperament, behavioral inhibition (BI, Lengua, 2008) and effortful control (EC, Olson et al., 2005) have consistently emerged as predictors of early externalizing problems. However, there have been relatively few attempts to simultaneously examine the main, independent, and interactive contributions of multiple dimensions of temperament on early developing externalizing problems. (Eisenberg et al., 1997). In addition to temperament, several dimensions of parenting during early childhood have been linked to young children's externalizing problems, both independently and in interaction with child attributes, such as BI and EC (Kiff, Lengua, & Zalewski, 2011). Thus, an additional goal of the current study was to test whether low levels of child BI and EC might amplify the positive association between harsh parenting and children's later externalizing problems, and whether low levels of child BI and EC might attenuate the negative association between

warm parenting and children's later externalizing problems. Finally, the genetically-informed design of the Early Growth and Development Study also permits exploration of the intergenerational genetic continuity of EC and BI, both of which have shown moderate levels of heritability in prior research (Lemery-Chalfant et al., 2008). The results revealed that higher levels of harsh parenting were linked to higher levels of externalizing problems . In addition, higher levels of warm parenting were linked with lower levels of externalizing problems and on occasion, interactions between EC and BI and warm parenting were found in the development of toddler externalizing problems. Importantly, the current investigation provides support for the notion that parenting behavior assessed in the toddler period, when effects due to genes shared among biologically-related family members are removed, is associated with children's subsequent externalizing problem behavior at 54 months.

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INTRODUCTION

Externalizing symptoms, such as aggression, impulsivity, and inattention, represent the most common forms of childhood maladjustment (Campbell et al., 2000). Empirical interest in early childhood behavior problems has been fueled by evidence of a link between early onset of externalizing behavior problems and antisocial behavior disorders in later childhood and adolescence (Campbell, 1995; Tremblay, Pihl, Vitaro, & Dobkin, 1994). Research illuminating early risk factors for externalizing behavior has the potential to inform effective prevention and intervention efforts.

1.1 TEMPERAMENT AND EXTERNALIZING PROBLEMS

Mounting evidence and theory strongly suggest that temperament plays an important role in vulnerability to children's early development of externalizing problems (Muris & Ollendick, 2005). Temperament has been defined as individual differences in reactivity and self-regulation (Rothbart & Bates, 1998). Reactivity refers to the arousability, excitability, and responsivity of affect, motor activity, and related responses. Self-regulation refers to processes that modulate reactivity, such as attention, approach/withdrawal, and self-soothing, which serve to facilitate or inhibit the behavioral and affective response (Rothbart & Bates, 2006; Rothbart & Derryberry, 1981). Two dimensions of temperament assessed in early childhood, BI (Shaw et al., 2003), a reactive factor, and EC (Olson et al., 2005), a regulative factor, have consistently emerged as predictors of early externalizing problems.

Theoretically, because low levels of BI may reflect under-arousal, an aversive state that may lead individuals to seek novel and dangerous activities, BI has been linked to the development of externalizing problems. Similarly, poor EC has been theoretically linked to the development of children's externalizing problems because such children have difficulty processing relevant information, modulating affective arousal, integrating information, and inhibiting inappropriate behavior (Eisenberg, Fabes, Guthrie, & Reiser, 2000).

Most prior research in this area has examined direct linkages between *individual* dimensions of temperament and young children's externalizing problems. During early childhood, dimensions of temperament such as negative emotionality (Lipscomb et al., 2012), novelty seeking (Tremblay et al., 1994), and resistance to control (Bates, Pettit, Dodge, & Ridge, 1998) have been positively associated with externalizing problems. Although it is clear that individual differences in dimensions of temperament are associated with behavior problems (Rothbart & Bates, 1998), there have been relatively few attempts to simultaneously examine the independent contributions of multiple dimensions of temperament, particularly regulative and reactive factors (Eisenberg et al., 1998). Rothbart and Bates (2006) have suggested that regulatory or control systems would be expected to moderate the impact of more reactive systems. Consistent with this theoretical formulation, Eisenberg et al. (2001) found an interaction effect wherein lower effortful control among 55-97 month olds in combination with higher anger/frustration was associated with externalizing problems. Similar research is needed on how early regulatory dimensions of temperament (e.g., EC) may moderate the impact of more reactive dimensions (e.g., BI) in relation to the development of early externalizing problems.

2.0 EFFORTFUL CONTROL

EC reflects a self-regulatory aspect of temperament. Introduced by Rothbart and colleagues (Rothbart & Ahadi, 1994), EC refers to the ability to inhibit a dominant response to perform a subdominant response. EC is a superordinate construct that includes attentional control, activational control, and inhibitory control. The function of EC is to modulate temperamental reactivity and to modify cognitions and behavior (Rothbart & Bates, 1998).

2.1 DEVELOPMENT OF EFFORTFUL CONTROL

EC begins to emerge at the end of the first year of life and undergoes major development between age 2 and 3 years, during which children show significant improvements in regulating their attention and behavior (Carlson, Mandell, & Williams, 2004). Although there is a normative pattern for the development of EC, there are also individual differences in the development of these skills. Individual differences in EC emerge during the toddler and preschool years (Diamond & Taylor, 1996; Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996) and show moderate levels of stability across childhood and adolescence (Eisenberg et al., 1999; Kochanska & Knaack, 2003).

2.2 INDIVIDUAL DIFFERENCES IN EFFORTFUL CONTROL

Children show a great deal of variation in EC. Previous researchers suggest that such individual differences have a biological or constitutional foundation. Findings from twin studies suggest a moderate to high level of heritability for EC. For example, using data pooled from studies conducted in four states with preschool twin pairs (ages 34-99 months), Goldsmith et al. (1997) found that parent-reported EC was 43-58% heritable, with a small shared environmental influence (0-12%). Additionally, on the basis of eight twin studies, Goldsmith et al. (2008) concluded that individual differences in childhood EC are at least moderately heritable. Beyond this evidence, very few studies with genetically-informed designs have been able to partition genetic from environmental influences on the development of emerging EC, with the exception of a study using data from the current sample that found genetic influences on toddler executive function, with associations found between birth mother verbal IQ and toddler effortful attention (Leve et al., 2012).

2.3 EFFORTFUL CONTROL AND EXTERNALIZING PROBLEMS

EC plays an important role in the development of a wide range of socio-emotional outcomes. High levels of EC have been linked to a number of positive outcomes, including moral conscience (Kochanska, Murray, & Coy, 1997; Rothbart & Ahadi, 1994), empathy/sympathy (Eisenberg et al., 1996), and social competence (Lemery, Essex, & Smider, 2002), as well as negatively related to a number of problem behaviors, including internalizing problems (Buckner, Mezzacappa, & Beardslee, 2009), decreased school readiness (Blair, 2002), and problematic peer relations (Spinrad et al., 2004). In addition, poor EC has been implicated in the development of children's externalizing problems

(Olson et al., 2005), including among studies of school-age children, adolescents (Eisenberg, Sadovsky, et al., 2005; Eisenberg et al., 2004), and toddlers and preschoolers (Eisenberg et al., 2009; Olson et al., 2005), the latter of which have included longitudinal designs (Eisenberg et al., 2009; Eisenberg, Zhou, et al., 2005; Valiente et al., 2006) and use of multiple informants and methods (Kochanska & Knaack, 2003; Olson et al., 2005). Poor EC has been theoretically linked to externalizing problems because such children have difficulty processing relevant information, modulating affective arousal, integrating information, and inhibiting inappropriate behavior (Eisenberg et al., 2000). For example, Kochanska and Knaack (2003) found that children's EC, measured with a battery of tasks at 22, 33, and 45 months, was related to increased mother-reported behavior problems at 73 months. In another prospective study, Lemery, Essex, and Smider (2002) found that mothers' reports of preschool children's attention focusing and inhibitory control (indicators of EC) negatively predicted mothers' and fathers' reports of externalizing problems and ADHD disorder at 5 ½ years. In sum, research has clearly established longitudinal associations between low EC and later externalizing problems, yet EC has typically been investigated without accounting for the contribution of other child attributes.

The majority of studies examining the association between EC and externalizing problems do not differentiate between "hot" and "cool" aspects of EC. Hot EC involves bottom down processes that operate in more motivationally and emotionally significant situations, while cool EC involves top-down processes that operate in more affectively neutral contexts. Results from a number of studies suggest that hot EC is associated with socio-emotional outcomes and that cool EC is associated with academic-related outcomes (Bar-On, Tranel, Denburg, & Bechara, 2003; Blair & Razza, 2007) . Few studies have examined whether hot and cool aspects of EC differentially predict externalizing problems (Kim, Nordling, Yoon, Boldt, & Kochanska, 2013).

3.0 BEHAVIORAL INHIBITION

Behavioral inhibition (BI), a reactive aspect of temperament, is defined as the tendency to display signs of fear and wariness in response to unfamiliar stimuli. Children with high BI have higher rates of anxiety disorders (Biederman et al., 1990), phobic disorders (Hirshfeld et al., 1992), depression (Caspi, Moffitt, Newman, & Silva, 1996), and social phobia (Hayward, Killen, Kraemer, & Taylor, 1998). At the opposite end of the spectrum, children with low levels of BI tend to be fearless and quick to approach new situations or people (Kagan, 1997). Theoretically, it is assumed that low levels of BI reflect under-arousal in situations that involve potential punishment. This underarousal is an aversive state that may lead individuals to seek novel and dangerous activities. Accordingly, BI has been linked to the development of externalizing problems.

3.1 DEVELOPMENT OF BEHAVIORAL INHIBITION

Longitudinal studies have noted moderate stability of BI from infancy or toddlerhood across early childhood, with correlations of stability ranging from .37 to .77 over follow-up periods ranging from 3.5 to 7 years (Derryberry & Reed 1994; Goldsmith & Lemery 2000; Kagan et al., 1989). Previous research indicates that individual differences in BI are largely attributable to genetic factors. Using a large sample of same sex twin pairs, Kagan and Saudino (2001) found that the heritability coefficients for BI, based on direct observations were between 0.5 and 0.6. Furthermore, behavior-genetic

examinations of extremely inhibited children have resulted in heritability estimates close to 100% (Dilalla et al., 1994). However, when the sample includes children who fall along the full continuum of BI, the heritability estimates are more moderate in size, ranging from 50% to 70% (Eley et al., 2003; Matheny, 1989).

3.2 BEHAVIORAL INHIBITION AND EXTERNALIZING BEHAVIOR

While extremely high levels of BI have been linked to social anxiety or phobias (Biederman et al., 1990; Schwartz, Snidman, & Kagan, 1999), low levels of BI measured in early childhood have been associated with multiple types of externalizing problems (Rubin, Burgess, Dwyer, & Hastings, 2003), including oppositional behavior and aggression (Raine, Reynolds, Venables, Mednick, & Farrington, 1998; Shaw et al., 2003). It is hypothesized that fearless toddlers are at risk for developing externalizing behavior because of their eagerness to explore more challenging and potentially dangerous situations, and their lesser fear of consequences for misbehavior. This hypothesis is supported by several longitudinal studies linking low BI or similar temperamental constructs observed in early childhood to externalizing problems in middle childhood or adolescence (Caspi, Henry, McGee, Moffitt, & Silva, 1995; Rubin et al., 2003). For example, Shaw and colleagues (2003) found that boys observed to show low levels of BI at age 2 were likely to show persistent trajectories of overt externalizing problems between ages 2 and 8. Similar to the research linking early EC to later externalizing problems, there is a growing body of research linking early levels of low BI to later externalizing problems, with this research also not typically considering other dimensions of temperament.

4.0 MODERATING EFFECT OF GENETIC RISK ON ASSOCIATIONS BETWEEN PARENTING AND CHILD TEMPERMANT

Although parenting has been linked to several dimensions of child temperament such as effortful control, fearful inhibition, and negative emotionality (Chen et al., 1998; Davidov & Grusec, 2006; Lengua, Honorado, & Bush, 2007), using non-genetically informed designed studies it is difficult to attribute this variance to parenting because genetic factors may not only affect the specific index of temperament (e.g., sociability) but also the rearing environment that children experience (e.g., hostile parenting practices (Harold et al., 2013). Thus, the effects of parenting on children's temperament may be due to shared genes through passive genotype-environment correlation (*r*GE) as opposed to the effects of parenting behaviors. The genetically informed design of the current investigation offers an unusual opportunity to examine how genetic risk, conceptualized as birth parent EC and BI, might moderate the magnitude of the association between harsh and warm parenting and offspring EC and BI while accounting for the possible confounding presence of passive *r*GE.

4.1 PARENTING AND EFFORTFUL CONTROL

EC is shaped by experience in the social world, including interactions with parents (Campos, Campos, & Barrett, 1989). Although limited, there is some evidence that warm, supportive parenting fosters children's EC (Li-Grining, 2007). When parents are warm and supportive, children are more

likely to internalize parents' requests for desirable behavior (Grusec & Goodnow, 1994) and implicitly learn from their parent's emotion regulation skills (Power, 2004). In one of the few studies conducted with toddlers, Spinrad et al. (2007) found that maternal supportive behaviors were positively associated with observations of children's EC. In contrast, harsh parenting has been found to inhibit the development of EC by modeling dysregulated behavior (Eisenberg et al., 2001). In sum, there is preliminary evidence highlighting an association between harsh parenting and lower levels of EC in older children and warm parenting and higher levels of EC, however it is not clear whether genetic risk would moderate the association of harsh and warm parenting and child temperament.

4.2 PARENTING AND BEHAVIORAL INHIBITION

While direct links between parenting and the development of EC have been established (albeit not moderating effects), direct links between harsh and warm parenting and reactive dimensions of temperament, including BI, and moderating effect of genetic risk, have been examined less extensively. Reactive control processes have been theorized to have a stronger biological basis than regulative control processes; therefore BI may operate in an automatic/involuntary fashion, whereas EC may be more amenable to socialization practices (Eisenberg & Morris, 2002). In one of the few studies examining genetic and environmental influences on the development of behavioral inhibition, Natsuaki et al. (2013) found an interaction between genetic risk and maternal responsiveness such that, children with genetic risk for social anxiety (inferred from birth mothers' social phobia) showed an elevation in behavioral inhibition when their mothers were less responsive. It remains unclear whether parenting dimensions such as overreactivity and warmth would be directly related to the development

of reactive processes, such as BI, or whether genetic risk would moderate the association between harsh and warm parenting and low levels of BI.

5.0 MODERATING EFFECT OF TEMPERAMENT ON ASSOCIATIONS BETWEEN PARENTING AND CHILD TEMPERMANT

Several dimensions of parenting during early childhood have been linked to children's later externalizing problems. In particular, harsh and overreactive parenting has been consistently linked with externalizing problems during early childhood and the early school-age years (Campbell et al., 2000; Maccoby, 2000; Shaw et al., 2003). Theories linking parenting to externalizing emphasize how harsh and overreactive parenting reinforces angry emotions (Dix, 1991; Scaramella & Leve, 2004), distresses children (O'Leary, Slep, & Reid, 1999), and affects the ability of children to regulate their emotions (Eisenberg et al., 1999).

In contrast to the negative effects of harsh parenting on later child adjustment, positive parenting constructs such as responsiveness (Propper, Willoughby, Halpern, Carbone, & Cox, 2007), warmth and positive affect (Kochanska & Aksan, 1995), and positive or 'gentle' control strategies (Gardner, 1994) have been found to predict lower levels of conduct problems in the preschool years. Theories linking warm parenting to low levels of externalizing problems emphasize children's willingness to internalize parental values and standards (Hoffman, 1983), ability to respond to parental efforts to focus their attention and guide their behavior (Eisenberg, Zhou, et al., 2005), and learning constructive ways to manage stress and relationships (Power, 2004). Despite this preliminary evidence for direct relations between positive dimensions of parenting and child externalizing problems,

additional research is needed to specify the relationship between warm parenting and child externalizing problems in families where the parent and child are not genetically related.

While several studies have established direct effects between multiple dimensions of caregiving and later externalizing problems in isolation from other child and contextual factors, Bates and Pettit (2007) have argued that temperament and parenting should be examined within the context of their interaction, as the effects of parenting are likely influenced by child attributes (and visa-versa). Consistent with reciprocal and transactional models of child socialization (Bell, 1968), in a sample of second graders, low levels of EC were more highly associated with externalizing behavior when their mothers were more hostile (Morris et al., 2002). In addition, Leve, Kim, and Pears (2005) found that among girls, harsh discipline at age 5 predicted higher age-17 externalizing behavior and increases in externalizing when fear/shyness (a construct similar to BI) was low but not when fear/shyness was high. Additional research is needed on the interactive effects of EC and BI in early childhood, as this time period is particularly important for the internalization of parental standards (Coie & Dodge, 1998).

6.0 STATEMENT OF PURPOSE

Externalizing problems have been the focus of much research in recent decades and multiple dimensions of temperament have been hypothesized as contributing factors to their development (Murris and Ollendick, 2005). However, there have been relatively few attempts to simultaneously examine the unique, independent, and interactive contributions of multiple dimensions of temperament on early developing externalizing problems, particularly regulative and reactive factors (Eisenberg et al., 1997). Furthermore, the adoption design has the potential to contribute to the existing literature on genetic influences on temperament because of its unique ability to capture effects of the genome as expressed phenotypically through behavior (Leve et al., 2013). Finally, there is a dearth of literature examining the potential moderating role of birth parent EC and BI on the magnitude of association between harsh and warm parenting and child BI and EC, and the moderating role of child BI and EC on the magnitude of association between harsh and warm parenting and later externalizing problems.

This current project seeks to fill some of these important gaps by examining direct, independent, and interactive associations between dimensions of child temperament, specifically BI and EC, assessed in the toddler period, and children's preschool externalizing problems. In addition, the study aims to assess continuity between biological parents' and offspring's EC and BI, investigate the contribution of genetic risk, conceptualized as birth parent's EC and BI, on moderating associations between adoptive parents' harsh and warm parenting and offspring's EC and BI, and, examine the moderating role of child BI and EC on associations between adoptive parent harsh and warm parenting

and externalizing problems. The design of this study has several methodological strengths, including the use of a prospective adoption design, a longitudinal design that has followed children's development from infancy to the late preschool period, and the use of multiple methods including observations and standardized questionnaires.

7.0 HYPOTHESES

Based on previous findings and theories, the following hypotheses will be tested.

1A. Direct effects of BI and EC on externalizing problems. Based on previous research examining linksbetween these dimensions of temperament and later externalizing problems (Kochanska & Knaack, 2003; Rubin et al., 2003), it is hypothesized that low levels of child BI and low levels of EC at 27 months will be directly related to high levels of child externalizing problems at 54 months.

1B. *Independent effects of BI and EC on externalizing problems*. Based on theoretical models emphasizing the complementary functions of reactive and regulatory dimensions of temperament (Rothbart and Bates, 2006), within a multivariate framework, it is hypothesized that low child BI and low EC assessed at 27 months will each contribute unique variance in the prediction of child externalizing problems at 54 months.

1D. *Interactive effects of BI and EC on externalizing problems*. Based on research suggesting that a regulative dimension of temperament may amplify a reactive dimension (Muris & Ollendick, 2005), it is expected the interaction between BI and EC at 27 months will contribute unique variance to the prediction of child externalizing problems at 54 months, such that children with both low levels of BI and EC will show higher levels of externalizing problems than children with low levels of one or neither of these factors.

2. *Intergenerational continuity in BI and EC*. Based on the extant literature suggesting a moderate degree of heritability for BI (DiLalla, Kagan, Reznick, 1994) and EC (Lemery-Chalfant et al., 2008), it is anticipated that there will be positive associations between biological parents' levels of BI and EC and children's BI and EC, respectively.

3. *Moderating role of birth mother EC and BI on associations between adoptive mother harsh parenting and child EC and BI.* Based on previous research suggesting that harsh parenting inhibits the development of EC and BI, it is hypothesized that higher levels of adoptive mother harsh parenting at 27 months will be associated with lower levels of child EC and BI at 27 months ((Eisenberg et al., 2001). Additionally, based on results from genetic studies suggesting that genetic risk and parenting interact to predict young children's behavior (Natsuaki et al., 2010), it is hypothesized that lower levels of birth mother EC and BI will amplify the negative association between adoptive mother harsh parenting and child EC and BI.

4. Moderating role of birth mother EC and BI on associations between adoptive mother warm parenting and child EC and BI. Based on results from previous research linking warm parenting to dimensions of temperament, it is hypothesized that higher levels of adoptive mother warm parenting at 27 months would be associated with higher levels of child EC and BI at 27 months (Chen et al., 1998; Davidov & Grusec, 2006; Lengua, Honorado, & Bush, 2007). Also, based on results from genetic studies suggesting an interaction between genetic risk and parenting on later child adjustment (Natsuaki et al., 2010), it is hypothesized that lower levels of birth mother EC and BI will attenuate the positive association between adoptive mother warm parenting and child EC and BI.

5. *Moderating role of child BI and child EC on the association between adoptive mother harsh parenting and externalizing problems.* Based on previous research suggesting a positive association between harsh parenting and externalizing behavior, it is hypothesized that higher levels of adoptive

mother harsh parenting at 27 months will be associated with higher levels of child externalizing problems at 54 months (Shaw et al., 2003). Additionally, it is hypothesized that low levels of child BI and EC at 27 months will amplify the positive association between adoptive mother harsh parenting and child externalizing problems at 54 months.

6. *Moderating role of child BI and child EC on the association between adoptive mother warm parenting and externalizing problems.* Based on evidence suggesting positive effects of warm parenting on later child adjustment, it is hypothesized that higher levels of adoptive mother warm parenting at 27 months will be associated with lower levels of child externalizing problems at 54 months (Boeldt et al., 2012). In addition, based on previous research showing that children vary in their sensitivity to supportive parenting based on their temperament, it is hypothesized that low levels of child BI and EC at 27 months will attenuate the negative association between adoptive mother warm parenting and child externalizing problems at 54 months.

8.0 METHOD

8.1 SAMPLE

The sample includes 361 adoptive families participating in the Early Growth and Development Study, an ongoing, multisite, longitudinal sample of adopted children, adoptive parents, and birth parents (Leve et al., 2013). The participants were enrolled between 2003 and 2006 using a rolling recruitment procedure in three regions of the United States: Mid-Atlantic, West/Southwest, and Pacific Northwest (N = 33 agencies in 10 states). Adoption agencies reflected the full range of adoption agencies in the United States: public, private, religious, and secular, with both open and closed adoption philosophies. Studies participants met the following eligibility criteria: (a) the adoption placement was domestic, (b) the infant was placed within 3 months postpartum, (c) the infant was placed with a nonrelative adoptive family, (d) the infant had no known major medical conditions such as extreme prematurity or extensive medical surgeries, and (e) the birth and adoptive parents were able to read or understand English at the eighth-grade level.

The EGDS recruitment staff had low rates of declines (2% of birth mothers, 20% of adoptive families, and 8% of birth fathers). Most nonparticipation resulted from the inability of the agency or the project to locate and contact a potential participant. Minimal systematic sampling biases were detected in recruitment. Data for comparisons were derived with the assistance of our participating adoption agencies, who recorded the education, income, and age

of all birth and adoptive parents who met the EGDS inclusion criteria and completed an adoption plan through their agency during the EGDS enrollment period. We compared the demographic information between triads who participated in the EGDS (*N* = 561 triads) with those of the eligible nonparticipants (*N* = 2,391 triads available for analysis). There were no significant demographic differences between birth mothers for whom birth fathers were recruited and birth mothers for whom birth fathers were not recruited, with one exception: birth mothers with non-participating birth fathers were less likely to be married or in a similarly committed relationship than birth mothers with participating birth fathers. These comparisons suggest that the EGDS sample is representative of the population from which it was drawn (Leve et al., 2013).

The majority of birth mothers were Caucasian (Caucasian = 71.1%, African-American = 11.4%, Hispanic/Latino=6.7%, Multi-ethnic=5.0%, Other=5.8%), as were birth fathers (Caucasian = 74.6%, African-American = 8.7%, Hispanic/Latino=8.7%, Multi-ethnic=4.8%, Other=3.2%). When the adopted child was born, birth parents were on average 24 years old(*SD* = 5.9 years) for mothers and 25 years (*SD* = 7.2 years) for fathers. Birth parents who disclosed their annual income reported earning less than $15,000 per year (birth mothers = 43.7%, birth fathers = 42.1%). More reported their highest level of education as high school or a high school equivalency degree (birth mothers = 50.5%, birth fathers = 62.9%).

The majority of adoptive mothers were also Caucasian (Caucasian = 91.4%, African-American = 3.6%,Hispanic/Latino=2.5%, Multi-ethnic=1.1%, Other=1.4%) as were adoptive fathers (Caucasian = 90.2%, African-American = 5.0%, Hispanic/Latino=1.7%, Multi-ethnic=1.1%, Other=2.0%) The average age of adoptive parents when the adopted child was born was 38 years (*SD* for mothers = 5.5 years; *SD* for fathers = 5.8 years). Of the adoptive parents who reported an annual household income, roughly half (53.0%) reported earning more than $100,000 per year. Adoptive

parents were typically college educated. The majority of adoptive parents were married (adoptive mothers=90.9%; adoptive fathers= 91.7%

Fifty-eight percent of the children were Caucasian, 11% were African American, 21% percent were multiethnic, 9% were Hispanic/Latino, and the remaining children were of other or unreported ethnic status. Forty-three percent of the children were female. The mean age of placement for adopted children was 7.29 days (*SD* = 13.46). Ninety-two percent of adopted children (92.3%) were placed in their adoptive homes within one month of birth. For full demographic information, refer to Leve et al. (2013).

For purposes of the current study, data from the 3- to 6-, 18, 54 month (child age) assessments were used to obtain data from birth parents about BI and EC, with observations of child EC and BI and reports about parenting obtained from adoptive parents at home assessments when children were 27 and 54 months old. Home assessments for adoptive families ranged in length from 2.5 to 4 hours.

8.2 MEASURES

8.2.1 Birth mother EC

Two validated EC measures for adults will be used: a color Stroop task (MacLeod, 1991) and the EC scale from the Adult Temperament Questionnaire (Evans & Rothbart, 2007). The Adult Temperament Questionnaire (ATQ, 18 month assessment) is a self-report measure that assesses stable and biologically-based characteristics and produces composite scores for Negative Affectivity, Orienting Sensitivity, and Effortful Control (Evans & Rothbart, 2007). For the current analysis, only the Effortful

Control scale was used. The EC scale consists of 19 items with Attentional Focusing, Inhibitory Control, and Activation Control subscales. Each item is rated from 1 (extremely untrue of you) to 7 (extremely true of you). Items were averaged to compute the scale score(α = .77 in current sample). In the computerized color Stroop task (3- to 6- month assessment), interference is created between a word's color and its meaning (MacLeod, 1991). Reaction time was computed as the interval in milliseconds between a word's appearance on the screen and a key press that indicated the font color in which the word was printed. The mean reaction time across the neutral, interference, and facilitation trials was used in the present study.

8.2.2 Birth mother BI

Birth mother BI was assessed at 54 months (child age) using the Behavioral Inhibition system/Behavioral Approach System scales (Carver & White, 1994). This measure has a total of 24 items, including 7 items that measure behavioral inhibition (e.g., "I worry about making mistakes," "I have very few fears compared to my friends," and "I feel worried when I think I have done poorly at something important.") Each question was scored on a 4 point scale, with values of 1 (very true for me), 2 (somewhat true for me), 3 (somewhat false for me), and 4 (very false for me). Items were summed to create a raw score (α = .73).

8.2.3 Adopted child EC

Two validated EC tasks for young children, administered at the 27-month assessment, were used: a shape Stroop task and a gift delay task. First, children were observed in a gift delay task (Kochanska et

al., 2000) to measure children's ability to inhibit behavior. In this "hot" EC task, the interviewer told the child that she had a present that she thought the child would really like, and told the child to sit with their hands over their eyes so that the interviewer could wrap the present. The interviewer instructed the child not to peek and then noisily wrapped the gift. After 1 minute, the interviewer gave the child the wrapped present but instructed the child not to touch the present until she returned with the bow. After 2 minutes, the interviewer returned with the bow and let the child open the present. Ratings of the child's ability to inhibit impulses were coded by the interviewer after the session, referencing the video recording, with the following three items: "How often did child peek?" (1 [*continually*] to 5 [*never*]); "How often did the child touch the gift when interviewer left the room?" (1 [*yes, repeatedly*] to 3 [*no, not at all*]); and "The child used distraction strategies" (1 [*very true*] to 4 [*not true*]). The three items were each rescaled 1 to 4 and then averaged to indicate greater ability to delay gratification (α=.54; r= .08, .32, and .46 among items).Ratings of the child's ability to inhibit impulses were coded by the interviewer after the session, referencing the video-recording, with the following three items: "How often did child peek?"; "How often did the child touch the gift when interviewer left the room?"; and "The child used distraction strategies." The 3 items were each rescaled 1 to 4 and then averaged to indicate greater ability to delay (α = .54).

Second, the Shape Stroop Task was administered (Carlson et al, 2004; Kochanska et al., 2000). In this "cool" EC task interviewer showed the child three large and three small pictures of the same fruits (apple, banana, orange). After reviewing the names and the meaning of each big–little dimension, the interviewer showed the child three pictures, each containing a small fruit embedded within a different large fruit (e.g., a small orange inside of a large apple). The interviewer then asked the child to point to each of the little fruits (e.g., "show me the little orange"). The prepotent response for young children is to point to the large fruit. After the fruit trials, the interviewer repeated the activity with a

similar set of three trials with pictures of big and little animals (bunny, dog, teddy bear). Each trial was scored on a 1–3 scale, with values of 1 (ambiguous or incorrect response on both item and size of object), 2 (correct item but wrong size), or 3 (correct item and correct size). Items were averaged to compute the scale score (Cronbach's α= .86). This scoring system is slightly modified from Kochanska et al. and Carlson et al., who included an additional scoring category for the child pointing to the incorrect item and then self-correcting by pointing to the correct item. In the present study, we did not witness such self-correcting behavior, perhaps due to the young age of the children. When children pointed to multiple items they were given a score of 1. A principal components analysis of the six task items obtained a one component solution (eigenvalue=3.59) using parallel analyses and Velicer's MAP tests, as recommended by O'Connor (2000).

8.2.4 Adopted child BI

Children's behaviors during the introduction to a novel toy at 27 months were coded to provide an index of BI. In the novel toy task a remote controlled Robot was manipulated to approach the child while making different movements and noises and child behaviors were coded in each of the 30-second intervals on a four-point scale from *(1) not inhibited/fearless* to *(4) much inhibited/fearful/not explorative* (Kochanska, 1991). Five categories were used to describe the behaviors: (a) the child's proximity to caregivers; (b) the child's inhibition of exploration; (c) the child's active exploration; (d) the global impression of the child's fearlessness with objects (i.e., the coder's overall impression of the child's fearlessness/fearfulness toward the toys); and (e) the coder's global impression of the child's inhibition/approach toward the toys. All five categories were aggregated to construct the child's behavioral inhibition (α = .92), with lower scores indicating the child's low inhibition and fearlessness.

8.2.5 Adopted mother warm parenting

Adoptive mother warm parenting was assessed using the 6-item Warmth subscale from the Iowa Family Interaction Rating Scales (Melby et al., 1993) at 27 months ($\alpha = .81$). Mothers reported on their own warmth toward their child on a 7-point scale ranging from *'never'* to *'always'* with high scores indicating greater warmth (e.g. "Let him/her know you really care about him/her," "Act loving and affectionate towards him/her," and "Tell him/her you love him/her.")

8.2.6 Adopted mother harsh parenting

Adoptive mother harsh discipline practices were assessed using the 7-item Overreactive subscale from the Parenting Scale (Arnold, O'Leary, Wolff, & Acker, 1993) at 27 months ($\alpha = .71$ in current sample). The scale was designed to identify parental discipline mistakes that relate theoretically to externalizing problems, with higher scores indicating more overreactivity. Each identified mistake was paired with its more effective counterpart to form the anchors for a 7-point scale.

8.2.7 Adopted child externalizing problems

Child externalizing problems were measured at 54 months using the 24-item, broad-band Externalizing factor from the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000), which includes all items from the narrow-band aggression and attention subscales (adopted mother $\alpha = .92$, adopted father $\alpha = .93$ in current sample).

8.2.8 Openness in adoption

Openness in adoption was accounted for in the analyses to control for similarities between birth and adoptive families that may have resulted from post-adoption exchanges between birth and adoptive families. Birth mother, adoptive mother, and adopted father individually reported ratings of perceived adoption openness, contact with their counterpart, and knowledge about their counterpart (Ge et al., 2008). As interrater agreement was high (r =.66–.81), each informant's score was standardized and an average was computed of the three reporters to construct a composite index of perceived openness in adoption during the first year post-placement.

8.2.9 Perinatal Complications

As perinatal complications can confound estimates of genetic and environmental influences, a perinatal risk index score was derived using the McNeil–Sjostrom Scale for obstetric complications (McNeil & Sjostrom, 1995) which assesses: (a) maternal/pregnancy complications (including illness, fetal distress during this period, exposure to drugs/alcohol, maternal stress and psychopathology, and psychotropic drug use), (b) labor and delivery complications (prolonged labor, cord complications, interventions needed), and (c) neonatal complications (prematurity, low birth weight). A total was created by summing the frequency of responses greater than three.

9.0 RESULTS

9.1 DATA ANALYTIC STRATEGY

For analyses involving adoptive parents' reports of child externalizing problems, both adoptive mothers' and adoptive fathers' reports were considered in separate sets of analyses. For analyses involving parenting and child externalizing problems in which adoptive parent reports are being used exclusively to measure both constructs (i.e., hypothesis 5 and 6), mothers' parenting was coupled with their reports of child externalizing problems and the other parents' reports of child externalizing problems. Fathers' reports of externalizing problems were included to corroborate analyses with mothers' reports of externalizing, given that adoptive mothers were also reporting on parenting in these analyses. Additionally, there were fewer adoptive fathers who participated in the final wave of data collection when externalizing problems were assessed. Considering the large amount of missing data for adoptive fathers, we were most confident reporting findings from the adoptive mother analyses. Convergence and divergence in the pattern of results across informants were noted.

9.2 DESCRIPTIVE ANALYSES

Table 1 presents the means, standard deviations, and range of scores of study variables. Several measures are commonly used in studies of early childhood, which facilitates comparison to other samples. For example, the factor scale mean of over-reactive discipline from a normative community sample of 3–7 year old children (Rhoades & O'Leary, 2007; M = 3.13, SD = .91) was higher than the factor scale mean reported by the mothers in the current sample (M = 2.09, SD = .59). Additionally, it is possible to compare observed scores on the CBCL to scores relative to normative samples on the externalizing factor. For ease of comparison to other samples, *t* scores are provided in presenting descriptive statistics for the CBCL externalizing factor in Table 1, although raw scores were used for testing hypotheses in models to avoid potential age and gender corrections. The 54-month measure of CBCL externalizing had approximately the same mean score as the mean score for national normative samples ($T = 50$, $sd = 8.75$). Using the borderline clinical cutoff for the CBCL (i.e., $\geq 84^{th}$ percentile), 9.4% of children were reported to have clinically elevated scores at 54 months. For all analyses involving child EC, separate regression models were computed for the gift delay task, an indicator of 'hot' EC, and the Stroop task, an indicator of 'cold' EC, because of their low association ($r = .04$, *ns*).

Table 1. Descriptives of Study Variables

Variable	Mean	SD	Min	Max
Child Effortful Control				
Gift Delay Task	2.04	0.86	1.00	4.00
Stroop Shape Task	1.83	0.59	1.00	3.00
Child Behavioral Inhibition	3.01	0.88	1.00	4.00
Birth Mother Effortful Control				
ATQ Effortful Control Scale	4.36	0.77	1.89	6.68
Stroop Color Task	725.82	116.73	454.96	1083.99
Birth Mother Behavioral Inhibition	14.52	3.61	7.00	28.00
Adoptive Mother Warm Parenting	25.88	2.31	16	28
Adoptive Mother Harsh Parenting	2.09	0.59	1.00	4.30
Adoptive Mother Report of Child Externalizing Problems	50.00	8.75	28.00	82.00
Adoptive Father Report of Child Externalizing Problems	48.06	8.88	28.00	76.00

9.3 DIRECT, INDEPENDENT, AND INTERACTIVE EFFECTS OF EC AND BI ON EXTERNALIZING PROBLEMS

9.3.1 Direct Effects

To test the hypothesis that child BI and EC would be associated with later externalizing problems in a univariate framework, a series of Pearson correlation coefficients were computed using observations of BI and EC at 27 months as independent variables and adoptive mothers' reports of the CBCL externalizing factor score at 54 months as the dependent variable. As shown in Table 2, hypothesis 1a was minimally supported, as there was a nonsignificant trend for 27 month BI (r = -.11, p < .10). In contrast to expectations, no significant associations were found between either 27-month EC constructs and externalizing problems.

When adoptive fathers' reports of externalizing problems were substituted for adoptive mothers' reports, there was only a nonsignificant trend between 27-month EC and 54-month externalizing (Stroop, $r = -.12$, $p < .10$).

Table 2. Pearson Correlations between BI and EC and Externalizing Problems

Variable	1.	2.	3.	4.	5.
1. Behavioral Inhibition	--				
2. Shape Stroop Task	-0.04	--			
3. Gift Delay Task	0.10^{+}	0.04	--		
4. Adoptive Mother Report of Child Externalizing Problem Behavior	-0.11^{+}	-0.08	-0.05	--	
5. Adoptive Father Report of Child Externalizing Problem Behavior	-0.01	-0.12^{+}	-0.00	0.47^{*}	--

9.3.2 Independent Effects

To assess the independent contribution of BI and EC and later externalizing problems, a multiple regression analysis was utilized in which the 54-month CBCL externalizing score was regressed simultaneously on the 27-month EC and BI indicators. Tables 3 and 4 show the multiple regression results predicting externalizing problems from observations of BI and EC. As shown in Table 3, in the first set of analyses, we used mothers' reports of child externalizing problems, for which there was only a nonsignificant trend for 27-month BI ($\beta = -.118$, $p < .10$). Thus, accounting for the effects of the Stroop task, there was trend for lower levels of BI to be associated with higher levels of child externalizing problems. When the gift delay task was substituted for the Stroop task as the measure of EC (Table 4), a nonsignificant trend remained for 27 month BI ($\beta = -.113$, $p < .10$). In this analysis,

accounting for the effects of the gift delay task, there was a nonsignificant trend for lower levels of BI to be associated with higher levels of externalizing.

In the second set of analyses, we used fathers' reports of child externalizing problems. In the analysis examining the independent effects of BI and EC (Stroop), only 27-month EC (Stroop) continued to account for trend-level significant in relation to 54-month externalizing behavior (β = -.12, $p < .10$, Table 3). In the analysis examining the independent effects of BI and EC (gift delay) at 27 months, neither variable emerged as a significant predictor of externalizing behavior at 54 months (Table 4).

Table 3. Multiple Regression Results Predicting Externalizing Problem Behavior (by informant) from observations of BI and EC(stroop)

	Mother-reports			Father-reports		
Variable	B	SE B	β	B	SE B	β
Behavioral Inhibition	-0.94	0.53	-0.12^{+}	-0.06	0.56	-0.01
Shape Stroop Task	-0.96	0.80	-0.08	-1.37	0.84	-0.12^{+}
	R^2 = .03, F(4, 222) = 1.84, *ns*			R^2 = .02, F(4, 203) = 0.95, *ns*		

Note. * $p < .05$. $^{+}$ $p < .10$.

Table 4. Multiple Regression Results Predicting Externalizing Problem Behavior (by informant) from observations of BI and EC(stroop)

	Mother-reports			Father-reports		
Variable	B	SE B	β	B	SE B	β
Behavioral Inhibition	-0.90	0.53	-0.11^{+}	-0.01	0.56	0.00
Gift Delay Task	-0.30	0.55	-0.04	0.02	0.56	0.00
	R^2 = .03, F(4, 223) = 1.60, *ns*			R^2 = .01, F(4, 204) = 0.29, *ns*		

Note. $^{+}$ $p < .10$.

9.3.3 Interactive Effects

To test the hypothesis that the interaction between low levels of BI and EC in early childhood would contribute unique variance in relation to externalizing problems after accounting for each predictor's

direct effects, a hierarchical multiple regression was conducted in which BI and EC were entered first, followed by entry of their interaction term. Independent variables were centered before interaction terms were created. In the first set of analyses, presented in Tables 5 and 6 we used mothers' reports of child externalizing problems. No significant interaction between BI and EC (Stroop) at 27 months was found on externalizing behavior at 54 months. A similar pattern emerged for BI and EC (gift delay); no significant interaction was found for BI and EC (gift delay) on externalizing problems.

The same pattern emerged when fathers' reports of child externalizing behavior was used as the dependent variable (Tables 5 and 6).

Table 5. Hierarchical Multiple Regression Results Predicting Externalizing Problems from the Interaction of BI and EC (gift delay)

	Mother-reports				Father-reports			
Variable	B	SE B	β	ΔR^2	B	SE B	β	ΔR^2
Step 1				0.01				0.00
Behavioral Inhibition	-0.90	0.53	-0.11^{+}		-0.01	0.56	0.00	
Gift Delay Task	-0.30	0.55	-0.04		0.02	0.56	0.00	
Step 2				0.00				0.00
Behavioral Inhibition x Gift Delay Task	-0.12	0.65	-0.01		0.08	0.67	0.01	
	$R^2 = .03$, F(5, 222) = 1.28, *ns*				$R^2 = .01$, F(5, 203) = 0.24, *ns*			

Note. * $p < .05$. $^{+}$ $p < .10$.

Table 6. Hierarchical Multiple Regression Results Predicting Externalizing Problems from the Interaction of BI and EC (gift delay)

	Mother-reports				Father-reports			
Variable	B	SE B	β	ΔR^2	B	SE B	β	ΔR^2
Step 1				0.02				0.01
Behavioral Inhibition	-0.94	0.53	-0.12^{+}		-0.06	0.56	-0.01	
Stroop	-0.95	0.80	-0.08		-1.37	0.84	-0.12	
Step 2				0.00				0.00
Behavioral Inhibition x Stroop	-0.38	0.90	-0.03		-0.13	0.96	-0.01	
	$R^2 = .03, F(5, 221) = 1.50$, ns				$R^2 = .03, F(5, 221) = 1.50$, ns			

Note. * $p < .05$. $^{+}$ $p < .10$.

9.4 INTERGENERATIONAL CONTINUITY

To test the hypothesis that birth mother BI and EC would be associated with child BI and EC, respectively, a series of Pearson correlations were computed using birth mother reports of BI and EC as independent variables and observations of child BI and EC at 27 months as dependent variables. As shown in Table 7, there was a significant association between child EC and birth parent EC, measured with developmentally appropriate Stroop tasks. As expected, a negative correlation was found between birth parent and child EC because higher scores on the birth parent Stroop indicate lower levels of functioning and higher scores on the child Stroop task indicate better EC (r = -.18, $p < .05$). However, substituting birth parent self-reports of EC for the Stroop task using the Adult Temperament Questionnaire, there was a nonsignificant trend for birth mother effortful control to be *negatively* associated with child effortful control, measured with the gift delay task (r = -.108, $p < .10$). In exploratory analyses, the ATQ was not significantly associated with any other study variables, so the negative association found between the ATQ and the gift delay task should be interpreted with caution. Furthermore, no significant associations were found between birth mother BI, assessed with the

Behavioral Inhibition scale of the Behavioral Inhibition system/Behavioral Approach System measure, and child BI, assessed with the Robot task (r = .09, *ns*).

Table 7. Intergenerational Continuity of EC and BI

Variable	1	2	3	4	5	6
1. Child Effortful Control (Stroop)	--					
2. Birth Mother Effortful Control (Stroop)	0.03*	--				
3. Child Effortful Control (Gift Delay)	0.04	-0.03	--			
4. Birth Mother Effortful Control (ATQ Effortful Control Scale)	0.03	0.02	-0.11*	--		
5. Child Behavioral Inhibition	-0.04	-0.10	0.10	-0.06	--	
6. Birth Mother Behavioral Inhibition	0.05	0.03	0.02	0.25*	0.09	--

Note. * p < .05. + p < .10.

9.5 MODERATING ROLE OF BIRTH MOTHER EC AND BI ON ASSOCIATION BETWEEN ADOPTIVE MOTHER HARSH PARENTING AND CHILD EC AND BI

To examine the hypothesis that birth mother EC and BI would moderate the association between adoptive mother harsh parenting and child EC and BI, respectively, hierarchical multiple regression analyses were computed in which the 27-month EC or BI score was regressed onto the birth parent BI or EC score, the 27-month adoptive mother harsh parenting score, and the interaction term between either birth parent EC or BI and harsh parenting. The results of these hierarchical multiple regression analyses are presented in Tables 8-10.

For the regression equation involving birth mother and child BI, no significant main effect was found for adoptive mother harsh parenting on child BI, but in contrast to the findings from univariate analyses, there was a nonsignificant trend between lower levels of birth mother BI and lower levels of child BI (β = .12, p < .10). However, no significant interaction was found between birth mother BI and adoptive mother harsh parenting on child BI. Similar patterns were found for the regression models examining birth mother EC and adoptive mother harsh parenting on child EC (Stroop and gift delay);

no significant interactions were found between birth mother EC and adoptive mother harsh parenting on both measures of child EC. In sum, no evidence was found to suggest that adoptive mother harsh parenting moderated associations between either birth parent BI or EC and child measures of the same construct.

Table 8. Hierarchical Multiple Regression Results Predicting Child EC(stroop) from Adoptive Mother Harsh Parenting and Birth Mother EC (stroop)

Variable	B	SE B	β	Δ R^2
Step 1				0.00
AM Harsh Parenting	0.03	0.06	0.03	
BM Effortful Control (Stroop)	0.00	0.00	0.05	
Step 2				
BM Effortful Control (Stroop)x AM Harsh Parenting	0.00	0.00	0.09	0.01

Note. Dependent Variable is Child Stroop Shape Task. $R^2 = 0.05$, F(5, 244) = 2.66
*$p < .05$.

Table 9. Hierarchical Multiple Regression Results Predicting Child EC(gift delay task) from Adoptive Mother Harsh Parenting and Birth Mother EC (ATQ)

Variable	B	SE B	β	Δ R^2
Step 1				0.01
AM Harsh Parenting	0.01	0.09	0.01	
BM Effortful Control (ATQ)	-0.13	0.07	-0.12$^+$	
Step 2				0.00
BM Effortful Control (ATQ)x AM Harsh Parenting	0.09	0.12	0.05	

Note. $R^2 = 0.03$, F(5, 240) = 1.52, *ns.*
$^+p < .10$.

Table 10. Hierarchical Multiple Regression Results Predicting Child BI from Adoptive Mother Harsh Parenting and Birth Mother BI

Variable	B	SE B	β	Δ R^2
Step 1				0.01
AM Harsh Parenting	-0.02	0.09	-0.02	
BM Behavioral Inhibition	0.03	0.01	0.12$^+$	
Step 2				0.00
BM Behavioral Inhibition x AM Harsh Parenting	-0.01	0.03	-0.03	

Note. $R^2 = 0.02$, F(5, 244) = 1.21, *ns*
$^+p < .10$.

9.6 MODERATING ROLE OF BIRTH MOTHER EC AND BI ON ASSOCIATION BETWEEN ADOPTIVE MOTHER WARM PARENTING AND CHILD EC AND BI

To examine the hypothesis that birth mother EC and BI would moderate the association between adoptive mother warm parenting and child EC and BI, respectively, two hierarchical multiple regression analyses were computed in which the 27-month EC or BI score was regressed onto the birth parent BI or EC score, the 27-month adoptive mother warm parenting score, and the interaction term between either birth parent EC or BI and warm parenting (see Tables 11-13).

The first model examined the main and joint effects of birth mother BI and adoptive mother warm parenting on child BI. The interaction between birth mother BI x adoptive mother warm parenting did not contribute significant variance to the prediction of child BI. A similar nonsignificant effect was found for the birth mother EC x adoptive mother warm parenting interaction in relation to child EC for the gift delay task.

Lastly, we examined the main and joint effects of birth mother EC (Stroop) and adoptive mother warm parenting on child EC (Stroop). Results demonstrated that there was a significant moderating effect of birth mother EC (Stroop) on the association between adoptive mother warm parenting and child EC (Stroop, $\beta = .12$, $p < .05$). To better understand this interaction, the effect of adoptive mother warm parenting on child effortful control (Stroop) for birth mother EC (Stroop) 1SD above/below the mean values was calculated and plotted according to procedures outlined by Preacher, Curran, and Bauer (2006). Results demonstrated that there was no effect of adoptive mother warm parenting on child effortful control at 1SD above or below mean values of birth mother effortful control. However, analysis of the region of significance (see Preacher et al., 2006) showed that the effect of adoptive mother warm parenting on child EC (Stroop) was significant for levels of birth

mother effortful control (Stroop) less than approximately 1.4 standard deviations below the mean (see Figure 1).

Table 11. Hierarchical Multiple Regression Results Predicting Child EC (stroop) from Adoptive Mother Warm Parenting and Birth Mother EC (stroop)

Variable	B	SE B	β	Δ R^2
Step 1				0.00
AM Warm Parenting	-0.01	0.02	-0.03	
BM Effortful Control (Stroop)	0.00	0.00	0.05	
Step 2				0.02*
BM Effortful Control (Stroop)x AM Warm Parenting	0.00	0.00	-0.13*	

Note. $R^2 = 0.06$, $F(5, 244) = 3.14$, $p < .05$
* p < .05.

Table 12. Hierarchical Multiple Regression Results Predicting Child EC (gift delay) from Adoptive Mother Warm Parenting and Birth Mother EC (ATQ)

Variable	B	SE B	β	Δ R^2
Step 1				0.02^+
AM Warm Parenting	0.04	0.02	0.10	
BM Effortful Control (ATQ)	-0.13	0.07	-0.11^+	
Step 2				0.01
BM Effortful Control (ATQ)x AM Warm Parenting	-0.04	0.03	-0.08	

Note. $R^2 = 0.04$, $F(5, 240) = 2.22$, $p < .05$
* p < .05. $^+$p<.10.

Table 13. Hierarchical Multiple Regression Results Predicting Child BI from Adoptive Mother Warm Parenting and Birth Mother BI

Variable	B	SE B	β	Δ R^2
Step 1				0.02*
AM Warm Parenting	-0.03	0.02	-0.07	
BM Behavioral Inhibition	0.03	0.01	0.11^+	
Step 2				0.00
BM Behavioral Inhibition x AM Warm Parenting	0.01	0.01	0.06	

Note. $R^2 = .03$, $F(5, 244) = 1.58$, *ns*
* p < .05. $^+$p < .10.

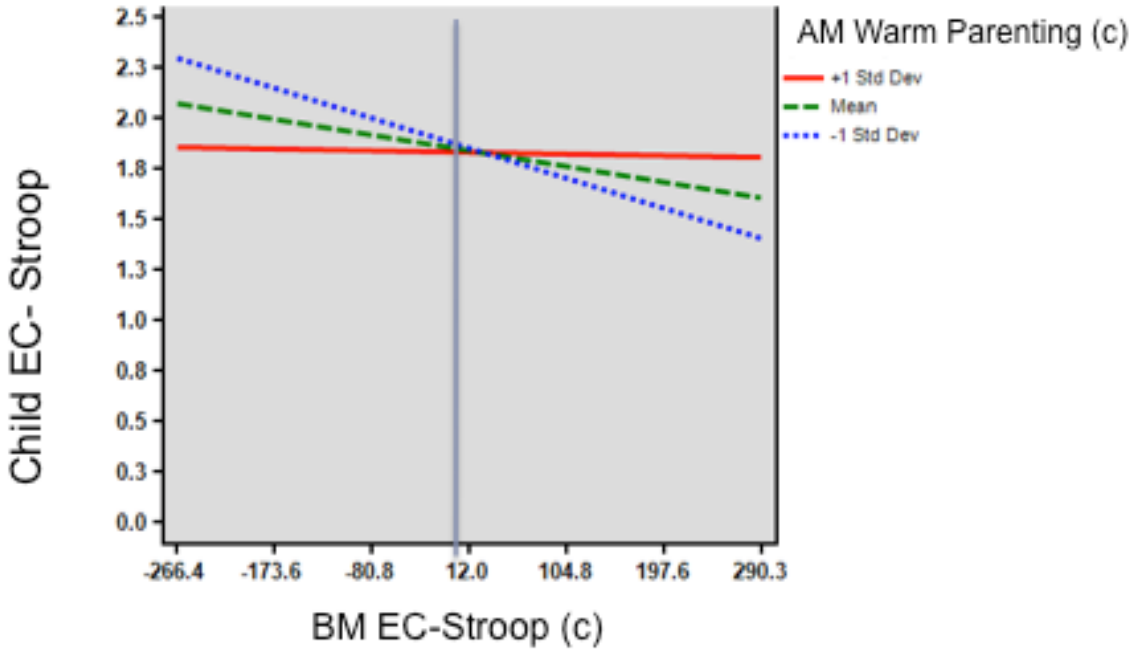

Figure 1. Moderating role of birth mother EC (stroop) on the association between adoptive mother warm parenting and child EC (stroop).

9.7 MODERATING ROLE OF CHILD BI AND EC ON THE ASSOCIATION BETWEEN HARSH PARENTING AND EXTERNALIZING PROBLEMS

To examine the hypothesis that child BI would moderate the association between adoptive mother harsh parenting and externalizing problems and that child EC would moderate the association between adoptive mother harsh parenting and externalizing, hierarchical multiple regression analyses were computed in which the 54-month externalizing factor was regressed onto either the 27-month BI or EC score, 27-month adoptive mother harsh parenting, and the interaction term between either EC or BI and harsh parenting. Results of these hierarchical regression analyses are presented in Tables 14-16.

We used mothers' reports of parenting and mothers' reports of child externalizing problems in the first set of analyses.

For analysis using adoptive mother harsh parenting and child BI, although results demonstrated that there was a main effect of higher harsh parenting to be predictive of higher levels of externalizing problems in the expected direction ($\beta = .272$, $p < .001$), and consistent with univariate analyses, there was a nonsignificant trend for lower levels of child BI at 27 months to be associated with higher levels of child externalizing problems at 54 months. Lastly, there was no significant moderating effect of child BI on the association between adoptive mother harsh parenting and externalizing problems.

Next we tested the moderating role of child EC on the association between adoptive mother harsh parenting and maternal reports of externalizing problems at 54 months. Although harsh parenting remained a significant predictor of externalizing problems, there was no significant moderating effect of child EC (Stroop and gift delay) on the association between adoptive mother harsh parenting and externalizing problems.

In the second set of analyses, we used mothers' reports of parenting and fathers' reports of child externalizing problems. The results demonstrated that there were main effects of harsh parenting no main effects of BI or EC, and no significant interactions between BI/EC and harsh parenting in relation to 54-month externalizing.

Table 14. Moderating Role of Child EC (stroop) on the association between Adoptive Mother Harsh Parenting and Child Externalizing Problems (by informant)

	Mother-reports				Father-reports			
Variable	B	SE B	β	ΔR^2	B	SE B	β	ΔR^2
Step 1				0.10**				0.05**
Stroop Shape Task	-1.07	0.74	-0.09		-1.46	0.81	-0.12^{+}	
AM Harsh Parenting	3.39	0.72	0.30**		2.24	0.83	0.18**	
Step 2				0.00				0.00
Stroop Shape Task x AM Harsh Parenting	-0.48	1.19	-0.03		-0.98	1.44	-0.05	
	$R^2 = .10$, F(5, 223) 5.12, $p < .01$				$R^2 = .05$, F(5, 206) = 2.37, $p < .05$			

Note. ** $p < .01$. * $p < .05$. $^{+}p < .10$.

Table 15. Moderating Role of Child EC (gift delay) on the association between Adoptive Mother Harsh Parenting and Child Externalizing Problems (by informant)

	Mother-reports				Father-reports			
Variable	B	SE B	β	Δ R^2	B	SE B	β	Δ R^2
Step 1				0.09**				0.03*
Gift Delay Task	-0.42	0.51	-0.05		0.12	0.53	0.02	
AM Harsh Parenting	3.26	0.72	0.29**		2.16	0.83	0.18**	
Step 2				0.00				0.00
Gift Delay Task x AM Harsh Parenting	-0.53	0.79	-0.04		-0.14	0.86	-0.01	
	$R^2 = .10$, $F(5, 224) = 4.676$, $p < .01$				$R^2 = .04$, $F(5, 207) = 1.62$, $p < .10$			

Note. ** $p < .01$. * $p < .05$. $^{+}$ $p < .10$.

Table 16. Moderating Role of Child EC (stroop) on the association between Adoptive Mother Harsh Parenting and Child Externalizing Problems (by informant)

	Mother-reports				Father-reports			
Variable	B	SE B	β	Δ R^2	B	SE B	β	Δ R^2
Step 1				0.09**				0.05**
Child Behavioral Inhibition	-0.87	0.52	-0.11+		0.42	0.57	0.05	
AM Harsh Parenting	3.07	0.74	0.27**		2.79	0.87	0.22**	
Step 2				0.00				0.00
Child Behavioral Inhibition x AM Harsh Parenting	-0.10	0.90	-0.01		-0.33	1.11	-0.02	
	R^2 = .10, F(5, 211) = 4.39, p < .01				R^2 = .06, F(5, 194) = 2.58, p < .05			

Note. ** p < .01. * p < .05. + p < .10.

9.8 MODERATING ROLE OF CHILD BI AND EC ON THE ASSOCIATION BETWEEN WARM PARENTING AND EXTERNALIZING PROBLEMS

To examine the hypothesis that child BI would moderate the association between adoptive mother warm parenting and externalizing problems and that child EC would moderate the association between adoptive mother warm parenting and externalizing problems, two hierarchical multiple regression analyses were computed in which 54-month externalizing factor was regressed onto either the 27-month BI or EC score, 27-month adoptive mother warm parenting, and the interaction term between either EC or BI and warm parenting. Results of these hierarchical regression analyses are presented in Tables 17-19. We used mothers' reports of parenting and mothers' reports of child externalizing problems in the first set of analyses.

We first examined the main and joint effects of child EC (gift delay task) and adoptive mother warm parenting on adoptive mothers' reports of child externalizing problems. Adoptive mother warm parenting was the only significant predictor of child externalizing problems (β = -.147, $p < .05$). An

interaction was evident between warm parenting and the gift delay task (β = 0.158, $p < .05$). Analysis of the region of significance showed that the effect of adoptive mother warm parenting on child externalizing problems was significant for levels of child effortful control (gift delay) less than .01 standard deviations above the mean (see Figure 2).

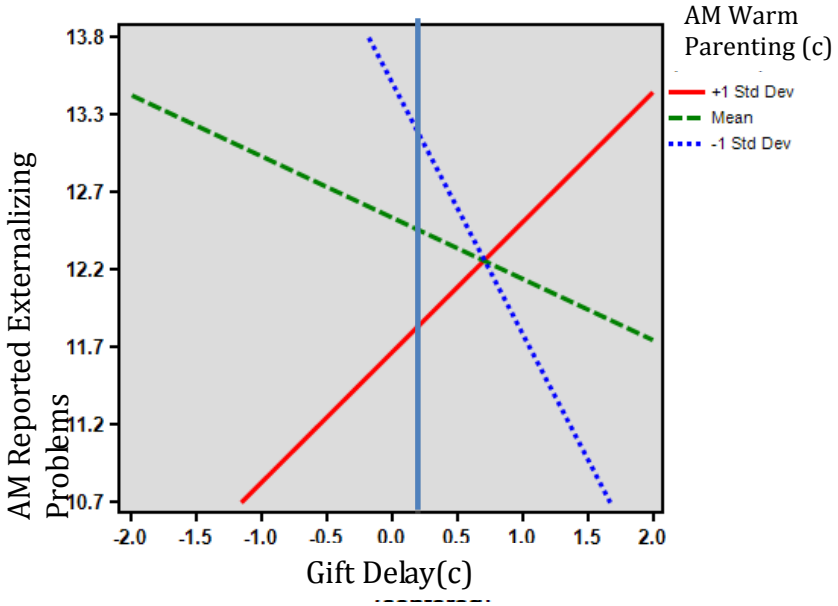

Figure 2. Moderating role of child EC (gift delay) on the association between adoptive mother warm parenting and child externalizing problems.

When the Stroop task was substituted for the gift delay task as the measure of EC, adoptive mother warm parenting remained a significant predictor of child externalizing (β = -.149, $p < .05$). There was no moderating effect of child EC (Stroop) on the association between adoptive mother warm parenting and externalizing problems.

Finally we tested the moderating role of child BI on the association between adoptive mother warm parent and externalizing problems. Although warm parenting remained a significant predictor of externalizing problems, there were no significant moderating effects of child BI on the association between adoptive mother warm parenting and externalizing problems.

In the second set of analyses, we used mothers' reports of parenting and fathers' reports of child externalizing problems. Adoptive parent warm parenting remained a significant predictor of child externalizing behavior (β = -.143, $p < .05$); however, there was no moderating effect of child EC (gift delay) on the association between adoptive mother warm parenting and externalizing problems.

When the Stroop task was substituted for the gift delay task as the measure of EC, a trend level interaction was evident between warm parenting and the Stroop task ($\beta = .124$, $p < .10$). It was found that having a birth mother high in warm parenting was associated with lower levels of child externalizing problems when levels of effortful control were low (B = -0.62, $p < .01$) but not when EC was high (B = 0.58, *ns*). Analysis of the region of significance showed that the effect of adoptive parent warm parenting on child externalizing problems was significant for levels of child effortful control (Stroop) less than .29 standard deviations below the mean (see Figure 3).

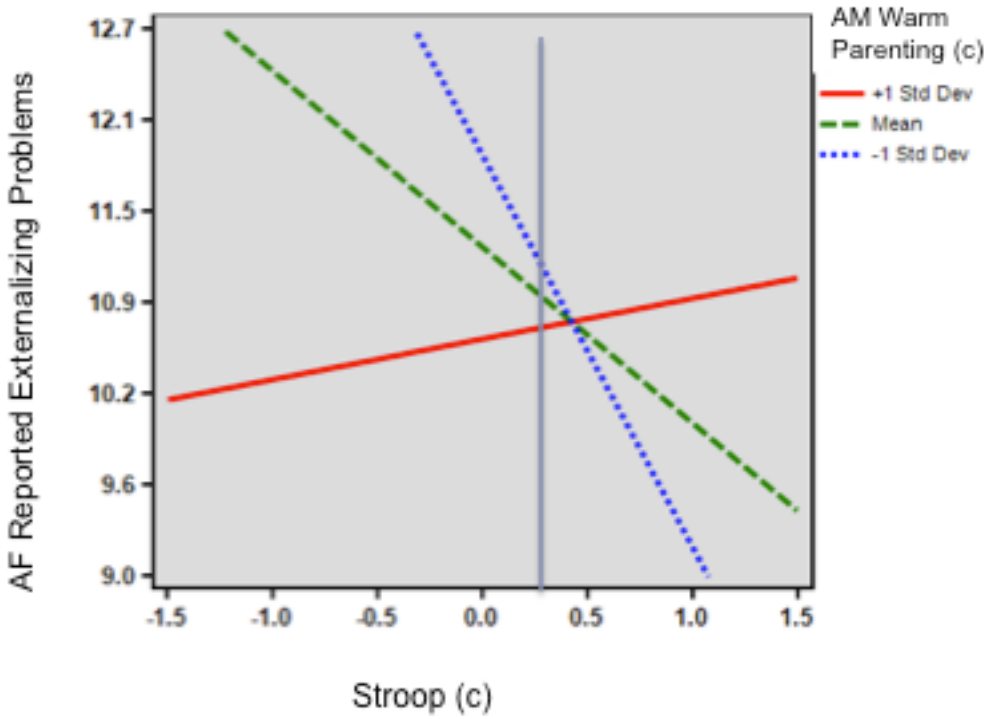

Figure 3. Moderating role of child EC (stroop) on the association between adoptive mother warm parenting and child externalizing problems.

Finally we examined the moderating effect of child BI on the association between adoptive mother warm parenting and externalizing problems. Again, the interaction effect was significant at a trend level (β = -.126, p < .10). It was found that having a birth mother high in warm parenting was associated with lower levels of child externalizing problems when levels of behavioral inhibition were high (B = -0.75, p < .01) but not when they were low (B = 0.01, *ns*). Analysis of the region of significance showed that the effect of adoptive parent warm parenting on child externalizing problems was significant for all levels of child behavioral inhibition above .19 standard deviations above the mean (see Figure 4).

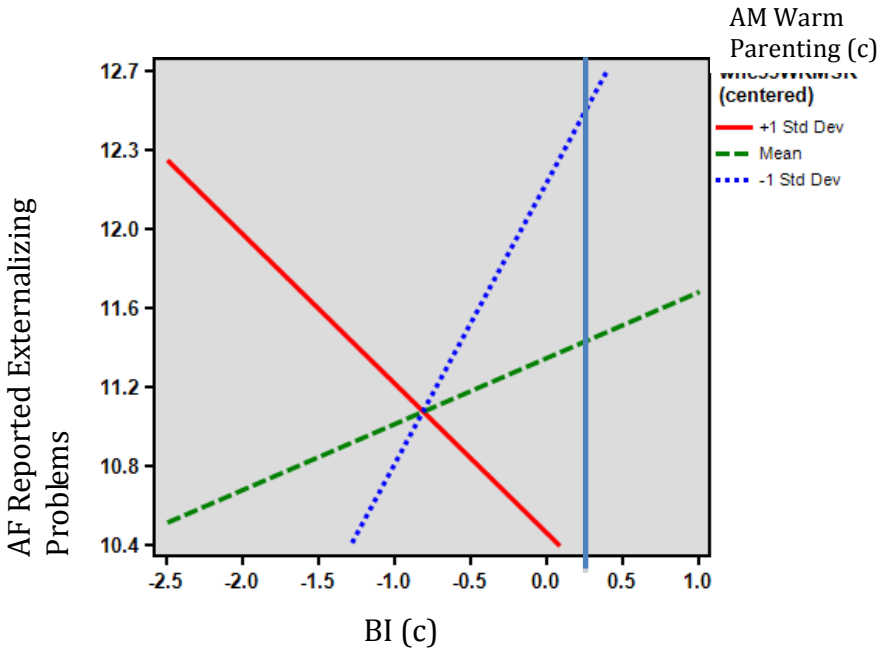

Figure 4. Moderating role of child BI on the association between adoptive mother warm parenting and child externalizing problems.

Table 17. Moderating Role of Child EC (stroop) on the association between Adoptive Mother Warm Parenting and Child Externalizing Problems (by informant)

	Mother-reports				Father-reports			
Variable	B	SE B	β	ΔR^2	B	SE B	β	ΔR^2
Step 1				0.03*				0.03
Stroop Shape Task	-0.96	0.76	-0.08		-1.27	0.82	-0.11	
AM Warm Parenting	-0.41	0.19	-0.15*		-0.40	0.20	-0.14*	
Step 2				0.00				0.02
Stroop Shape Task x AM Warm Parenting	-0.14	0.28	-0.03		0.63	0.34	0.13^{+}	
	$R^2 = .04$, F(5, 223) = 2.30, *ns*				$R^2 = .05$, F(5, 206) = 2.30, p < .05			

Note. * p < .05. $^{+}$p < .10

Table 18. Moderating Role of Child BI on the association between Adoptive Mother Warm Parenting and Child Externalizing Problems (by informant)

	Mother-reports				Father-reports			
Variable	B	SE B	β	ΔR^2	B	SE B	β	ΔR^2
Step 1				0.04*				0.02^{+}
Child Behavioral Inhibition	-0.94	0.54	-0.12^{+}		0.21	0.58	0.03	
AM Warm Parenting	-0.43	0.18	-0.16*		-0.44	0.21	-0.15	
Step 2				0.00				0.02^{+}
Child Behavioral Inhibition x AM Warm Parenting	-0.08	0.22	-0.03		-0.45	0.24	-0.14	
	$R^2 = .05$, F(5,211) = 2.04, p < .10				$R^2 = .05$, F(5,194) = 2.13, p<.10			

Note. * p < .05. $^{+}$p < .10

Table 19. Moderating Role of Child EC (gift delay) on the association between Adoptive Mother Warm Parenting and Child Externalizing Problems (by informant)

	Mother-reports				Father-reports			
Variable	B	SE B	β	ΔR^2	B	SE B	β	ΔR^2
Step 1				0.04*				0.02^{+}
Child Behavioral Inhibition	-0.94	0.54	-0.12^{+}		0.21	0.58	0.03	
AM Warm Parenting	-0.43	0.18	-0.16*		-0.44	0.21	-0.15	
Step 2				0.00				0.02^{+}
Child Behavioral Inhibition x AM Warm Parenting	-0.08	0.22	-0.03		-0.45	0.24	-0.14	
	$R^2 = .05$, F(5,211) = 2.04, p < .10				$R^2 = .05$, F(5,194) = 2.13, p<.10			

Note. * p < .05. $^{+}$p < .10

10.0 DISCUSSION

The current investigation used an adoption design to examine links between early dimensions of child temperament, adoptive mother parenting, and childhood externalizing problems. This study addresses limitations of previous studies by examining the independent and interactive contributions of multiple dimensions of temperament implicated in the development of early externalizing problems, and by investigating the effect of parenting behavior on externalizing problems, when effects due to genes shared among biologically-related family members are removed. We conducted a plethora of analyses, of which only relatively few were significant in the expected direction and as such, hypotheses were generally not supported. Specifically, we did not find support for the notion that indicators of EC and BI contribute to later externalizing problems. Consistent with our hypothesis, higher levels of harsh parenting were linked to higher levels of externalizing problems, but unexpectedly these associations were not moderated by variations in different dimensions of child temperament. Also in accord with our hypothesis, higher levels of warm parenting were linked with lower levels of externalizing problems and on occasion, interactions between EC and BI and warm parenting were found in the development of toddler externalizing problems. Importantly, the current investigation provides support for the notion that parenting behavior assessed in the toddler period, when effects due to genes shared among biologically-related family members are removed, is associated with children's subsequent externalizing problem behavior at 54 months.

10.1 DIRECT EFFECTS OF BI AND EC ON EXTERNALIZING PROBLEMS

Contrary to our hypothesis, neither measure of 27-month EC was associated with later externalizing problems. Past research suggests that EC and related measures of self-regulation measured in early childhood are associated with lower levels of later externalizing problems (Olson et al., 2005; Spinrad et al., 2007), but not always. The majority of these studies that found a significant association between EC and externalizing behavior relied on parental/teacher reports of effortful control and parental/teacher reports of externalizing behavior. In contrast, like our study, Murray and Kochanska (2002) used observational measures to assess EC and did not find a significant association between EC and problem behaviors in the toddler years or between EC and a broad range of externalizing problems in the preschool years. Thus, the way in which EC is assessed appears to affect whether there is an association found between EC and externalizing problems. Given the inconsistencies across method and the unique advantage of each method, it may be useful to include both parent reports and observational measures to assess EC. This would allow us to examine whether the same pattern of findings would be found when different assessment methods were used.

An additional explanation for the null findings may be that we examined EC as two distinct constructs. Comparisons across studies of EC have shown that the interrelations among different measures of EC are modest to negligible, suggesting that EC cannot be reliably measured by assessing a singular facet or dimension (Milich & Kramer, 1984; Olson, 1989). Additionally, factor analyses support the contention that effortful control is a complex, multidimensional construct (Murray & Kochanska, 2002). For example, using principal components analyses with a battery of EC tasks administered to a sample of toddlers, Murray and Kochanska (2002) obtained two components (using 6 tasks): one for delay and gross motor movement and one for the abilities to suppress or initiate behavior. Therefore, using a latent variable may provide a more robust assessment of EC.

Contrary to our hypothesis, children's low levels of BI were only marginally related to higher levels of externalizing problems. This finding is inconsistent with other studies that have found significant associations between low levels of BI measured in early childhood and multiple types of externalizing problems (Raine, Reynolds, Venables, Mednick, & Farrington, 1998; Shaw et al., 2003). While potentially surprising, it is important to note that some researchers have proposed that behavioral inhibition is a behavioral construct best examined at its extremes (Kagan, Reznick, & Gibbons, 1989; Kagan, Snidman, & Arcus, 1995). According to their perspective, children at the extremes are qualitatively different than "average" or "less extreme" toddlers and although the majority of temperamental traits are regarded as continuous variables, most agree that it is the individuals at the extremes of the distribution who are most vulnerable (Rothbart & Bates, 1998). In this regard, it may be that using a continuous measure of behavioral inhibition obscured any association between BI and externalizing problems. Yet, we conducted exploratory analyses to evaluate this association with children categorized at the extremes of the distribution, and we still did not find significant differences in externalizing problems between children with the lowest BI scores (1 SD below the mean) and children with the highest BI scores (1 SD above the mean). One potential explanation for the lack of association found between BI and externalizing problems may involve the fact that there is a relatively narrow range of scores (only 9.4% of children had clinically elevated scores) on the externalizing variable, possibly as a result of the sample's low risk status. A restricted range affects the sizes of correlation and regression coefficient estimates.

10.2 MODERATING ROLE OF CHILD BI AND EC ON THE ASSOCIATION BETWEEN ADOPIVE MOTHER HARSH PARENTING AND EXTERNALIZING PROBLEMS

Results from the current study support previous research that has consistently documented links between harsh parenting and high levels of externalizing problems during early childhood and the early school-age years (Campbell et al., 2000; Maccoby, 2000; Rothbaum & Weisz, 1994; Shaw et al., 2003). However, the majority of these studies involve biologically related family members, thereby limiting understanding of the role of genetic and/or environmental underpinnings of parenting on child psychopathology. This study extends previous research by documenting the environmental influence of maternal harsh parenting during toddlerhood on the development of externalizing problems in early childhood in genetically unrelated families.

The above-mentioned finding suggests an effect of parenting on child behavior. However, we did not examine whether child to parent effects would be evident with respect to harsh parenting. Prior work with the current sample indicated direct associations between 18-month child aggression and both adoptive mother and adoptive father hostile parenting (Stover et al., 2012), which are consistent with other reports of a reciprocal relationship between child behavior and parenting (Colder, Lochman, & Wells, 1997; Gault-Sherman, 2012; Scaramella & Leve, 2004). Hence, future studies using the current sample may wish to investigate transactional associations between harsh parenting and child externalizing problems.

Although we found a direct association between harsh parenting and child externalizing problems, we did not find the hypothesized interaction between EC or BI and harsh parenting at 27 months and child externalizing at 54 months. Thus, contrary to expectations, the relationships between harsh parenting and later externalizing problems did not differ by level of BI or EC. Past studies have found

self-regulation or effortful control to moderate the relation between parental control/negativity and externalizing problems (Lengua, Bush, Long, Kovacs, & Trancik, 2008; Veenstra, Lindenberg, Oldehinkel, De Winter, & Ormel, 2006). A possible explanation for this set of null findings is that prior studies that demonstrated moderating effects of attentional skills and regulatory capacity were conducted with older children and adolescents (Henry, Caspi, Moffitt, & Silva, 1996; Wills, Sandy, Yaeger, & Shinar, 2001). Effortful control may play a stronger moderating role for older children, coping with demands of school and various social responsibilities. Alternatively, the moderating effects of child effortful control may be demonstrated for other domains of parenting and family environment, such as if parents met DSM criteria for Major Depressive Disorder or in the presence of more disrupted family relations, such as separation, divorce, and multiple transitions (Choe, Olson, & Sameroff, 2013)

10.3 MODERATING ROLE OF CHILD BI AND EC ON THE ASSOCIATION BETWEEN ADOPTIVE MOTHER WARM PARENTING AND EXTERNALIZING PROBLEMS

Consistent with our hypothesis, findings from this study documented that higher levels of adoptive mother warm parenting at 27 months were significantly associated with lower levels of child externalizing problems at 54 months. Previous research has found that parental warmth or positivity is associated with fewer externalizing problems, involving a range of cultural and socioeconomic groups and using a variety of research methods (Chen, Liu, & Li, 2000; Harrist & Waugh, 2002; Pettit, Bates, & Dodge, 1993). The negative association between warm parenting and externalizing problems would be expected on the basis of attachment theory (Bowlby, 1969) and perspectives that emphasize the relation between parental nurturance and children's willingness to internalize parental values and

standards (Hoffman, 1983). Children who internalize appropriate regulatory skills and values are able to respond adaptively to a wide range of challenging situations and are less likely to exhibit externalizing problems (Cunningham, Kliewer, & Garner, 2009; Dix, 1991).

In addition to the direct association between warm parenting and child externalizing problems, results indicated that child effortful control moderated the associations between adoptive mother warm parenting and child externalizing problems. This finding suggests that maternal warmth has a buffering effect against the risk for externalizing behavior for children with low levels of effortful control. Additionally, these results underscore the importance of caregiving, particularly for children at higher risk for developing problem behavior. Few previous studies have examined interactions between positive parenting and effortful control (Gartstein & Fagot, 2003; Olson et al., 2005) and when computed for positive parenting dimensions such as warmth, interactions have typically been nonsignificant. However, interactions have been found between positive aspects of parenting and broader measures of temperament predicting externalizing problems, such as 'difficult temperament,' emphasizing various aspects of both reactivity and self-regulation (Bradley & Corwyn, 2008). It may be that the regulative aspect of "difficult" temperament is driving the significant interaction. Further research is needed to examine whether the magnitude of associations between positive dimensions of parenting and externalizing problems in young children are moderated by different levels of reactive and regulative dimensions of temperament.

10.4 LIMITATIONS

Although the current study has a number of important strengths, there are several limitations that need to be noted. First, adoptive families had limited ethnic and socio-demographic diversity,

which affects the generalizability of our findings. Therefore, the findings reported here may or may not be representative of what might be expected with more heterogeneous samples, reflecting a wider range of individual difference characteristics. Additionally, it is unclear whether the findings from this study would be generalizable to clinical populations, especially based on the normative scores found for the CBCL. Furthermore, the current findings (effects of parenting on externalizing problems after accounting for genetic factors) might not be generalizable to such clinical populations where both genetic and environmental risk might be higher than in the current sample. Therefore, the generalizability of findings to high-risk home environments and more ethnically diverse samples needs to be documented before stronger conclusions can be drawn.

Second, although a primary strength of these analyses is the adoption design that rules out passive *r*GE, the possibility of evocative *r*GE remains as an explanatory mechanism. Evocative *r*GE suggests that inherited characteristics of the child affect their parents' behavior towards them (Dunn, Plomin, & Daniels, 1986). Evocative *r*GE has been evidenced in samples of genetically-unrelated parents and children (Ge et al., 1996); thus, it is possible that genetic characteristics of the child influenced the parenting measured in the current study. Future research is needed to examine the evocative role of the child in connecting genetic background and family processes.

An additional limitation is the use of parent-report data for measures of parenting and child externalizing problem behavior. The analytical technique of including fathers' reports of child externalizing behavior helped to alleviate concerns related to reporting bias. Analyses with cross rater approach (mothers' reports of parenting and fathers' reports of externalizing problems) should be considered with more confidence as they minimize inflation of correlations due to common rater effects. Furthermore, we conducted supplementary analyses with fathers' reports of parenting and mothers' and fathers' reports of externalizing problems. We found similar main effects of fathers'

reports of harsh and warm parenting on externalizing problems (mothers' and fathers' reports). Ideally self-reports of parenting would have been corroborated by direct observations of parent– child interactions that were coded for harsh and warm parenting.

The number of birth fathers participating in this study was only one-third that of the number of BMs. Considering the large amount of missing data for birth fathers, we were more confident reporting findings from the birth mother data rather than using only a small proportion of birth father data. In future years, the current study will have increased statistical power for detecting Genotype x Environment interactions with birth father data, due to an enlarged sample size via the recruitment of a second cohort of adoptive and birth families (Leve, Neiderhiser, Scaramella, & Reiss, 2010). Similarly, there were fewer adoptive fathers who completed all of the measures at 54 months, thereby decreasing sample size and statistical power.

10.5 FUTURE DIRECTIONS AND CLINICAL IMPLICATIONS

This study corroborated a consistent finding in the literature that parenting is important to the development of early childhood externalizing problems and thus is an important area for prevention and intervention. Importantly, caregiving practices of adopted parents, both positive and negative dimensions, were directly related to later externalizing problems, corroborating decades of research that could not unpack genetic from environmental influence when examining associations between parenting and child problem behavior. If the current findings could be shown to be generalizable to at-risk populations, it would suggest that prevention efforts and interventions directed at parenting are a promising avenue for improving child behavioral trajectories (e.g., Garber et al., 2011). In fact, in multiple randomized controlled trials, changes in positive parenting have significantly mediated

changes in child externalizing problems (Dishion et al., 2008; Gardner, Burton, & Klimes, 2006). Additional work in this area could refine interventions in terms of targeting specific parenting practices aimed at preventing the development of maladaptive outcomes.

Finally, although we did not find an interactive effect of BI and EC on early developing externalizing problems, further research is needed to explore other possible interactions between these and other dimensions of temperament. Previous research has consistently documented links between children's levels of negative emotionality and externalizing problems in childhood and adolescence (Eisenberg et al., 2009; Shaw, Bell, & Gilliom, 2000). Furthermore, Eisenberg et al. (1992) presented a heuristic model in which negative emotionality moderates the association between emotion regulation and externalizing problem behaviors. According to their model, children who are not prone to frequent and intense negative emotions are less in need of effortfully managing their attention and emotions emotion because they are unlikely to become overaroused. Consistent with this view, a number of investigators have reported that individual differences in children's negative emotionality and regulation interact when predicting externalizing problem behaviors, even among young children (Stifter, Spinrad, & Braungart-Rieker, 1999). Future work with this sample could investigate the interaction between negative emotionality and effortful control in the development of early childhood externalizing problems.

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